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10/500,562	01/10/2005	Toshio Kamei	G0126.0231	5194

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EXAMINER	
YEH, EUENG NAN	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,562	KAMEI, TOSHIO	
	Examiner	Art Unit	
	EUENG-NAN YEH	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *Jan 17, 2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL ACTION

Response to Amendment

1. The following Office Action is responsive to the amendment and remarks received on May 9, 2008. Claims 1-18 remain pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 5, 8, 9-10, 13, and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the reference of Center, JR. (US 2003/0059124 A1).

Regarding claims 1 (method), 9 (apparatus), and 17 (CRM), Center discloses a metadata generation system comprising:

a> clipping a plurality of different local areas of said image (as depicted in figure 1, numerals 28 and 30 to find head and eye, respectively);

b> extracting frequency features for the respective local areas ("The invention advantageously uses a transformation into the frequency domain to more efficiently

correlate the acquired image with the set of stored images" in paragraph 9, line 4. See also figure 9, numeral 330 "The system then normalizes the unknown facial image, as set forth in step 330 ... and converts the normalized image data into the frequency domain using DFFT 210B ..." in paragraph 99, line 1);

c> projecting feature vectors, which are vectors consisting of said frequency features, onto predefined subspaces; thereby extracting the projected feature vectors of the respective local areas so as to generate the projected feature vectors as face metadata (as depicted in figure 1, numeral 36: "The actual encoding or compression process can employ a Karhunen-Loeve transformation or an eigenvector projection technique, which encodes an image of a person's face or other facial feature, such as nose, eyes, lips, and so forth, as a weighted set of eigenvectors ... an image of a face is projected onto a face space defined by a set of reference eigenvectors. The reference set of eigenvectors, or eigenfaces, can be thought of as a set of features which together characterize the variation between face images within a reference set of facial images. This distribution of faces in the reference set of faces can be characterized by using principal component analysis to extract face information that characterizes the variations or differences between a newly acquired image (the projected image) and the eigenfaces ... Once the eigenfaces are identified an image signal can be represented as a function of these eigenfaces by projecting the image signal into the space defined by these eigenfaces" in paragraph 110, line 8. Center further teaches the concept of standardized function: "... the image as a function $I(\underline{x})$ of a first pixel location $\underline{x}$, and mapping the function $I(\underline{x})$ to a standardized function $p(\underline{x}, \underline{y})$ of the first pixel location $\underline{x}$,

and a second pixel location $\underline{y}$ ..." in paragraph 20, line 5. For the application of this concept of standardized function can be seen "Let $I(\underline{x})$ be the image to be analyzed, where $I(\underline{x})$ is moved under the window function to analyze it. The effect of brightness and contrast variations in the part of the image under the window is to be minimized by standardizing I(x) by scaling and translation ... new function $p(\underline{x}, \underline{y})$ that has zero mean and unit power ... These conditions require that

$$p(\underline{x}, \underline{y}) = [I(\underline{x}-\underline{y})-m(\underline{y})]/s(\underline{y}) \quad \text{(Eq. 16)}$$

" in paragraph 86, line 1. The s(y), as defined in equation 18, is the square root of the variance of the image power. Without departing from the scope and spirit of Center's methodology, this concept of standardization can apply to the eigen field such that the numerator of equation 16 can be considered as the subspace being predefined by basis vectors and the denominator of equation 16 can be considered as the square root of a corresponding eigenvalue in order that "variations in the part of the image under the window is to be minimized" in paragraph 86, line 3).

Regarding claims 2 and 10, power spectral intensities of Fourier frequencies obtained by discrete Fourier transform are extracted as said frequency features (discussed in claim 1, the Discrete Fast Fourier Transform (DFFT) used for the analysis. Thus, the amplitudes of the DFFT coefficients, i.e. the power spectral intensities of DFFT, can be extracted as frequency features).

Regarding claims 5 and 13, said subspaces are specified by basis vectors previously obtained by principal component analysis for frequency features, and frequency feature vectors are projected onto the specified subspaces to calculate principal component vectors (discussed in claim 1, the principal component analysis (PCA) used for the subspace data processing).

Regarding claims 8 and 16, wherein area positions corresponding to the respective local areas are searched as said local areas in said image, clipping positions are obtained, and after that, the local areas are clipped (depicted in figure 1, numeral 28 to find head, numeral 30 to find eye. Figure 6 is a more detailed schematic representation of the primary eye find stage 30 of figure 1).

4. Claims 3-4 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art of Center as applied to claims 1, 9, and 17, and further in view of Satonaka et al. (US 6,236,749 B1).

Regarding claims 3-4 and 11-12, Center discloses a metadata generation system with DFFT for the frequency features as discussed in claims 1 and 9. Center does not explicitly disclose DCT or DST frequency features.

Satonaka, in the same field of endeavor of feature extraction ("recognizing an object in a three-dimensional space based on the feature patterns of a two-dimensional image" at column 1, line 5), teaches the feature pattern transformation "by using a two-dimensional discrete cosine transform or a two-dimensional discrete sine transform,

thereby obtaining frequency components in a two-dimensional space" at column 3, line 25.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include the metadata generation system Center made with DCT/DST capability as taught by Satonaka, such that various frequency components can be extracted and "... a number of the components maximizes recognition precision" at column 3, line 34.

5. Claims 6-7 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art of Center as applied to claims 1, 9, and 17, and further in view of Philomin et al. (US 2003/0113002 A1).

Regarding claims 6-7 and 14-15, Center discloses a metadata generation system with PCA used for the subspace data processing as discussed in claims 1 and 9. Center does not explicitly disclose ICA or LDA processing.

Philomin, in the same field of endeavor of eigen feature study ("relates generally to person recognition" in paragraph 2, line 1), teaches the usefulness of eigenspace "... eigenface vectors can be used for identifying a person from a video image. In a similar manner, any method or system that generates eigenvoice vectors can be used for identifying or verifying the identity of a person from audio information. In the present invention, the face feature data and voice feature data for any one person are concatenated to form a composite eigenvector, and this composite eigenvector is used for person identification and/or person verification" in paragraph 21, line 2. The dimension of voice supervector can be reduced "by any linear transformation that

reduces the original high-dimensional supervectors into voice basis vectors. A non-exhaustive list of examples of linear transformation includes: Principal Component Analysis (PCA), Independent Component Analysis (ICA), Linear Discriminant Analysis (LDA), Factor Analysis (FA), and Singular Value Decomposition (SVD)" in paragraph 34, line 12. Furthermore, "Dimensionality reduction yields one voice eigenvector for each one of the training speakers ... The voice eigenvectors that make up the eigenvoice space each represent a different dimension across which different speakers may be differentiated" in paragraph 35, line 2. Without departing from the scope and spirit of Philomin's methodology, linear transformation such as PCA, ICA, and LDA can be applied to eigenface analysis.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include the metadata generation system Center made with ICA and LDA transformation as taught by Philomin, such that "different speakers may be differentiated" in paragraph 35, line 9.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art of Center as applied to claim 1 and further in view of Goldberg (US 6,526,158 B1).

Regarding claim 18, Center discloses a metadata generation system comprising:
a face image input unit for inputting a face image (as depicted in Center figure 1, numeral 22);
a face metadata generating unit for generating face metadata from an inputted face image (as depicted in Center figure 2, detection stage #50 and PCA #36);

a face metadata storage unit for storing generated face metadata therein, a face similarity calculating unit for calculating a similarity of a face from said face metadata, a face image database for storing said face images (as depicted in Center figure 1, numeral 34 "The image manipulation stage 34 places the image in suitable condition for compression and subsequent comparison with pre-stored image identification information" in paragraph 36, line 9);

a controller for controlling, in response to a registration request and a retrieval request of the image, input of the image, generation of the metadata, storing of the metadata, and calculation of face similarity (as depicted in Center figure 1, numerals 26 and 34 "the frame grabber 26 is conventionally configured to capture and digitize image frames" in paragraph 39, line 7. See also "frame grabber 26 produces a digitized frame output signal 44 which is operatively communicated with multiple locations ..." in paragraph 40, line 1. "The image manipulation stage 34 places the image in suitable condition for compression and subsequent comparison with pre-stored image identification information" in paragraph 36, line 9) comprises:

area clipping means for clipping local areas of said face image (as depicted in Center figure 1, numerals 28 and 30);

frequency feature extracting means for extracting frequency features for the areas clipped by said area clipping means (as depicted in Center figure 1, numeral 34 and figure 9, numerals 315, 330);

vector projection means for projecting feature vectors, which are vectors consisting of the frequency features extracted by said frequency feature extracting means, onto

predefined subspaces (as depicted in Center figure 1, numeral 36 "compression stage 36, which can be a principal component analysis compression stage. This stage produces eigenvectors from a reference set of images projected into a multi-dimensional image space. The vectors are then used to characterize the acquired image. The compression stage 36 in turn generates an output signal which serves as an input to a discrimination stage 38, which determines whether the acquired image matches a pre-stored image" in paragraph 36, line 13);
said face metadata generating unit extracts the projected feature vectors of a plurality of different local areas so as to generate the projected feature vectors as face metadata (as depicted in Center figure 2, PCA stage #36 "... This stage produces eigenvectors from a reference set of images projected into a multi-dimensional image space. The vectors are then used to characterize the acquired image ..." in paragraph 36, line 15), said subspaces being predefined by basis vectors obtained by previously dividing a components of each basis vector by the square root of a corresponding eigenvalue (as discussed in claim 1 for the projecting feature vectors extraction).

Center does not explicitly disclose a display system.

Goldberg, in the same field of endeavor of person identifier ("digital identifier of the person whose representation is stored" at column 2, line 60), teaches in figure 4e "The image of the face of patron 43 is analyzed for features particular to that face, including the distances between different features (such as eyes, base of the nose, and the center of the mouth), and more abstract metrics such as the eigenface and eigenfeature decomposition of the face" at column 11, line 60. Furthermore, figure 2:

"Once the patron 43 is identified, the images corresponding to the patron 43 may be retrieved from the image storage device 71, and the images projected onto the viewing screen 85 for the patron to review ..." at column 15, line 46.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include the metadata generation system Center made with a display unit as taught by Goldberg so that the user can review the result.

Response to Arguments

a) Summary of Applicant's Remark:

The previous 101 rejections should be withdrawn in view of the amendment.

Examiner's Response:

Examiner agrees, and the previous 101 rejections are withdrawn.

b) Summary of Applicant's Remarks:

"In amended claim 1 the subspaces are predefined by basis vectors obtained by previously dividing a component of each basis vector by the square-root of the corresponding eigenvalue" at response page 8, bottom paragraph.

Examiner's Response:

Center teaches the concept of standardized function which is applicable to the eigen space such that the basis vector can be normalized by the square-root of the eigenvalue. Refer to the rejections above.

Conclusion

7. Applicant's amendment is rejected in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eueng-nan Yeh whose telephone number is 571-270-1586. The examiner can normally be reached on Monday-Friday 8AM-4:30PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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